GCSE

Mathematics C

General Certificate of Secondary Education **J517**

Reports on the Units

March 2010

J517/R/10M

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GCSE Mathematics C (J517)

REPORTS ON THE UNITS

Chief Examiner's Report

General Comments

As in the past, the majority of the entries for the units in this March session were from year 11 candidates, although the flexible nature of this specification means that some centres use this session of modules for those who are in the first year of the course. As usual, examiners saw some excellent performances. However, some candidates who are aggregating this summer were entered well above their comfort zone in this session and therefore did not experience the positive achievement that is intended for this course.

Centres are reminded that GCSE mathematics specifications change for aggregation from June 2012, so that year 9s who took modules in this session will need to aggregate in January 2012, at the latest, for their work in this session to be available towards their GCSE grades.

B272 Module Test M2

General Comments

Candidates made a serious effort to show what they could achieve. About a half of candidates gained more than half of the available marks, with less than 10% gaining under a quarter of the available marks.

Performance was broadly similar to that on the equivalent module sat last March. There was a wide spread of marks in both sections of the paper, but overall candidates tended to do better on Section A than Section B, with an average margin of about 1 mark.

There were a few instances of questions not attempted. In terms of omissions Q.8(c)(ii), Q.8(d)(ii), Q.8(b)(i), Q.3(b)(i) and Q.2(b) were the worst, with omission rates of ranging from about 10% to 20%.

There were no obvious instances of candidates misinterpreting the rubric, although there was some evidence that in Q.8(d)(ii) some candidates interpreted length of time as meaning a physical linear length. The overall standard of presentation was generally satisfactory, although there were instances where digits were less than clear. Candidates appeared not to have found time a problem.

In common with previous years there were candidates who failed to write down working and as a consequence failed to gain any of the available method marks. This was particularly evident in Q.1(c), Q.1(f) and Q.4.

Areas which candidates found particularly challenging were: converting between metric units (Q.1(a) and (b)), multi-step problems (Q.4), and finding percentages (Q.8(a).

Areas where candidates performed best overall included: interpreting bar charts and tables (Q.1(g) and (d)), interpreting a sketch map (Q.6(c)), simple money calculations (Q.1(c)) and interpreting negative temperatures (Q.7(b)).

Comments on Individual Questions

Section A

1 **(a)** A poorly answered question, in common with similar questions in previous sessions. Candidates' answers ranged from 20 to 200 000. Almost three quarters of candidates failed to gain any credit.

(b) Found challenging, but slightly bettered answered than the previous part. Most candidates appeared to realise that the answer involved a power of ten, but less than a third were successful. Common wrong responses were 23, 230 and 2300

(c) Quite well answered: partial credit was available for evidence of finding the total of the weekly saving, eg by the sight of "£40".

(d)(i) & (ii) This was an accessible question with the majority scoring all 3 marks.

(e)(i) & (ii) Reasonably well answered overall, with part (ii) found to be the greater challenge.

(f) A number of candidates were unable to select the correct operation. Others struggled with completing the correct subtraction and dealing with the zero, but many found no difficulty with this question.

(g)(i) & (ii) Both parts were very well answered; the vast majority of candidates were successful.

2 (a) Not as well answered as previous questions of a similar nature. Nevertheless almost two thirds of candidates gained at least partial credit.

(b) Only about a third of candidates were successful. It appeared from some responses that a large proportion of candidates did not have access to protractors or angle measurers. Answers around 145° were indicative of use of the wrong scale.

3 (a) Not a well answered question. This may have been in part because of some candidates' unfamiliarity with dominoes, although similar resources to the one used in the question are common learning aids.

(b)(i), (ii) & (iii) This part question was found particularly challenging by the lower scoring candidates for the whole paper, especially part (i).

4 This multi-step question was found problematic. Some candidates got to 10 (the total weight of the tin cans, for which there was some credit) but were then unsure how to progress. These candidates reached 4.3 × 10 then went on to 4 × 10 plus 3 × 10 to give 70, which was not an uncommon answer. Candidates must be encouraged to show working out, especially for longer questions. In this case the lack of evidence shown meant that many candidates would have missed out on partial credit.

Section B

5 (a) Most candidates gained some partial credit and were able to identify those shapes which did have reflection symmetry. Problems arose in identifying those which did not. In a very few cases candidates' answers were ambiguous.

(b) Not well answered. Many candidates assumed that one answer was required and this, coupled with an additional wrong response, gained no credit.

6 (a)(i) & (ii) Part (i) was better responded to than part (ii). Nevertheless, it was surprising to see the number of candidates who were unable to identify the relevant even numbers.

(b) Quite well answered. The great majority realised that a subtraction was required but problems arose in actually performing the calculation. There was strong evidence that a proportion of candidates did not use calculators here.

(c) A very well answered question where the majority of candidates gained full credit.

7 (a) This was found challenging by all candidates, which was surprising given its fairly standard nature. Unrealistic guesses were seen.

(b)(i) & (ii) Over two thirds of candidates gained full credit for this part question. In part (i) the most common error was to indicate -7°C. Performance on part (i) was better than on part (ii).

8 **(a)** Overall a very poorly answered question, apart from by the highest scoring candidates on the whole paper, who achieved well. However the question was an effective discriminator, with some able to jot the answer down with little or no working, indicating efficient use of calculators. Common wrong responses were 101 (from 76 + 25) and 51 (from 76 – 25).

(b)(i) & (ii) The great majority realised that 3 or 4 carriages were needed, but many found the actual explanation challenging, with few explicitly stated that the problem required the number of carriages to be rounded up. Full credit was in fact given for presentation of the correct working and some reference to the fact that there would be 4 extra seats left over.

The second part, requiring use of a timetable, was found too challenging by almost two thirds of candidates. Incorrect answers appeared not to follow any pattern and were fairly evenly distributed between the options, suggesting that candidates had difficulty interpreting the situation.

(c)(i) & (ii) Only about a third of candidates were successful in part (i) and this dropped to a tenth for part (ii). Responses tended to make reference to even numbers only and did not differentiate sufficiently.

(d)(i) & (ii) The majority of candidates gained at least partial credit for part (i) but instances of performing the calculation “the wrong way round” were not uncommon. The majority found part (ii) too great a challenge: a number were unable to express themselves in sufficient detail to gain full credit, but gained partial credit for mentioning “slower” in some form.

B273 Module Test M3

General Comments

Candidates' scores were generally better in Section B than in Section A. Candidates consistently found difficulty with the numerical problems. They often attempted inappropriate methods when multiplying and dividing by powers of 10. Reasons, where required, were rarely succinct and often wrong. Working out was often lacking, especially with the mean, and equations were usually solved intuitively. Because of the lack of working, part marks were rarely awarded. Most candidates attempted all of the questions and many were able to score well on the tally table and resulting bar chart.

There was no evidence that candidates were short of time to complete the assessment.

Comments on Individual Questions

Section A

1 **(a)** Candidates often employed long multiplication methods inappropriately or misplaced the decimal point and 'added zeroes'.

(b) Candidates often misplaced the decimal point, and 249 was a common error.

2 **(a)** This question was reasonably well attempted, although 17 (ignoring the hierarchy of operations) appeared as a too frequent error.

(b) A significant minority of candidates did not read the question and attempted to complete the cards with other numbers. Some of these resulted in 5 but gained no credit in a single mark question. Many attempted the question using 5, 4 and 3 but did not achieve the required arrangement.

3 **(a)(i)** Answers of 12 were common. When attempted, 6×6 did not always result in 36.

(ii) Answers of 8 were common. Few candidates used the "hint" in the diagram.

(b) Many candidates correctly shaded 7 squares. A very few candidates shaded 7 squares in <u>each</u> large square: these were given full credit as a special case. Very little working was seen but, where it was given, it revealed an errors in calculating $70 \div 10$.

4 **(a)(i)** Many correct answers were seen although 0850 was common.

(ii) Significant numbers of candidates gained 2 marks. Some working was shown although it often revealed standard methods of "counting in ten" applied to time. 0950 was a common error.

(b) Some, but not many, candidates wrote £96 ÷ 4 and gained 1 mark. Most answers were given without working. A few candidates gave £32 (division by 3) as their answer and gained 1 mark.

5 **(a)** In some responses 525 appeared without working to gain 2 marks. Where working was shown it often revealed the belief that 500 (and sometimes 100) ml = 1 litre, or showed 475 – 1 (475 ml – 1 litre).

(b) Wrong answers of 8 or 9 were common, when candidates failed to subtract from 10. Misreads of the scale were also common, thinking that the arrow indicated 12.

6 **(a)** Vey few correct references to the width/thickness of shape B, or lengths of <u>all</u> lines, were seen. "Because it's the wrong shape", "Because it is", and "It <u>is</u> an enlargement" were typical responses.

(b) The better responses showed neatly ruled diagrams. Many gained 1 mark for a correct length top line. Poorer diagrams were drawn freehand, lacked symmetry and were often not six squares high.

7 **(a)** Probability was clearly a challenge for most, with many candidates remaining at the stage of using probability words, rather than fractions. That said, "Certain" was accepted here, as was 100%, and gained full credit. Answers of 5/5 revealed a misunderstanding that cost marks later but scored the mark here.

(b) 2/5 sometimes followed from (a) and scored 1 mark for the numerator. Frequent errors were "likely", "evens" and so on.

(c)(i) Surprisingly few candidates could calculate the mean of these numbers. 7 (the median) was often seen. Some candidates showed working and, amongst these, a total of 30 was sometimes achieved. The intention to divide by 5 was sometimes stated but rarely achieved and × 5 was a common error.

(ii) Many gained full marks for recognising that the mean would not change. For candidates who gave the original median of 7 as the mean, 2 would now be given here. Some attempted to rework the question with varying degrees of success. Many candidates gave elaborate (and often wrong) answers, focussing on the orders of the cards.

Section B

8 **(a)** The estimation was not done well and, combined with reasoning, meant that many did not get this mark. Answers such as "The dinosaur is not standing up straight" and "Brian is taller than that" were not uncommon.

(b) Only the best responses found 2/5 of 4·5 metres. Where working was shown, it revealed poor understanding of finding fractions of an amount.

9 **(a)** This was generally done well, although "embedded" answers were often given (and were condoned in this instance throughout Q.9).

(b) This was also well answered but with 3 a common error.

(c) This was relatively poorly answered with 2 and 3 (but also 1 and 4) commonly stated.

10 **(a)** Well answered. Most candidates gave 40 mph.

(b) Also well answered.

11 **(a)** Better responses often just gave 4 metres and gained full marks. Some wrote 8 (the length of the car in centimetres, for 1 mark). However, many gave apparently unrelated answers with no working to support them. Few gave 16, the error from doubling rather than halving.

(b) Better responses tackled this question quite well, though even here many misused the scale.

12 **(a)** Many candidates scored full marks. Part marks were rarely awarded for attempting to use a flow chart or inverse, as working was so rarely seen.

(b) Many candidates scored full marks. Few showed working although it was clear that many who did not score 2 marks had used the formula from part (a). Part marks were rarely awarded for attempting to use the flow chart as working was so rarely seen.

13 **(a)(i)** This was usually answered well. "From above" (or the side) were common errors.

(ii) This was also answered well.

(b) The better responses scored 2 marks although many lost marks by filling in <u>all</u> the empty faces of the net.

14 **(a)** Candidates answered this very well. An error was to not use tallies but write frequencies in the tally column. Sometimes these candidates went on to attempt relative frequencies in the final column. Miscounting was not often seen and most candidates tallied using the "five bar gate" method. This would gain 1 mark in the event of a numerical error.

(b) Most candidates gained 2 marks, even if it was from following through their tallies. Errors included columns of varying widths and columns separated by differing amounts.

(c) Most candidates gained the mark with a "relative" response. Statistical language was sometimes used correctly, including "highest frequency". Some failed to gain the mark for writing "she got 9 votes" and not relating this to the popularity of other names. The common slip of giving Charlotte and Grace the same number of "votes" was followed through.

A very small number responded that he was not correct as "George" was not in the list of names. Some comments showed that candidates regarded this as a popularity contest for girls in a group, rather than favourite names from a list – this was not penalised.

B274 Module Test M4

General Comments

Candidates seemed to have been entered at the appropriate level for their ability. There were very few completely blank or mostly correct papers. Most candidates seemed to have had adequate time to complete the paper.

There was little or no working seen in a lot of scripts and this sometimes prevented the awarding of method marks for the longer questions. Many candidates did not use a calculator for Section B and this prevented them gaining some marks in this section. The other main weakness was poor ability with number, as witnessed in Q.1 and Q.2, confusion between the terms factor and multiple in Q.3 and mode, mean and median in Section B.

Comments on Individual Questions

Section A

1 **(a)** A significant number used the length of the decimal as an indication of its magnitude and wrote 0·04 0·43 0·403 0·3264 as the answer. Another common error was to put 0·04 as the last number rather than the first.

(b) This was very poorly answered and there were many incorrect answers. Errors seen included 2, 5, 25 and 50.

2 This is a standard question, yet it was very poorly answered. Few attempted the traditional method, with partitioning as the preferred option. In this method candidates clearly knew how to use it, but many made arithmetical errors in one or two boxes such as 40 × 30 which was written as 120. A significant few recorded 32 as 3 and 2 rather than 30 and 2. The Gelosia/lattice method was not as frequently used as has been seen in the past and most using it did so correctly, but again with arithmetical errors in one or two squares. There was no appreciation of the expected order of magnitude of the answer, with answers in the low hundreds readily given. However, the large majority of candidates did have a systematic approach to the calculation even if they made numerical errors. A few candidates attempted multiple additions and this always ended in failure.

3 **(a)** Candidates did not do well here. 27 was a common incorrect answer for prime number and 4 also appeared several times.

(b) Factors and multiples were often confused, with 16 a frequent answer in this part.

(c) This question, however, was done very well with the majority getting it correct, even if they had got the previous two parts wrong.

4 Most candidates did not know these facts. Many answered 22 for the weight by getting the 2·2 conversion the wrong way round. The capacity was done the best and many got it correct. The distance was the least well known fact and 72 was a common answer.

5 **(a)** It was common to get this first part correct although some used 7 or 9 as the denominator, probably through miscounting. Some used the wrong forms for probability such as 'in' or 'out of'. These were penalised only once in question 5.

(b) Many counted the odd numbers incorrectly and gave an answer indicating 4 odd numbers rather than 5.

(c) Most answers had a probability of less than 1, so it was clear that many had not noted that all these numbers are factors of 12.

6 This was well answered, with the last one proving to be the most difficult and answers of 2 or 6 quite common.

7 **(a)** The majority of candidates read the scale correctly and gave the answer 40.

(b) This question required interpretation of a part of the graph and to comment on what had happened to the train. Many candidates referred to the distance remaining the same, which did not interpret the situation.

(c) Reading the time scale was well done, although a few did not write the time in the usual format. Some gave the time as close to 10 08 such as 10 09 or 10 10 suggesting that they had misread the scale.

8 **(a)(i)** Most candidates realised the drawing consisted of an r brick and a p brick but several thought it should be multiplied rather than added.

(ii) This part was completed better than part (i) in that $3p$ was seen much more frequently. Many gave the unsimplified version $p + p + p$.

(b) There were more non-responses here, but those who attempted it were accurate in their drawing and some did better in this part than the previous two parts, suggesting that they understood the use of algebra but had more trouble writing it in symbols than drawing it.

9 Most candidates reflected in the x-axis instead of the y-axis, so few gained the mark here.

Section B

10 **(a)** Correctly answered by about half of the candidates. The main mistakes were from those not drawing the quadrilateral: if they had done so they could have spotted the errors.

(b) Most candidates answered this correctly, including those who answered part (a) incorrectly. The most common error was to transpose the coordinates.

11 **(a)** Some candidates went straight to the statement that 16 was not a factor of 60. Incorrect answers either said that both rules were wrong or that both numbers were not factors of 60. There was quite a lot of confusion about the phrase 'difference of 11'.

(b) Most candidates scored at least 1 mark. Better answers found numbers to satisfy both rules while weaker ones concentrated only upon satisfying one rule.

12 **(a)** Well answered by most candidates.

(b) Again well answered by most candidates. Stronger answers explained the whole process, while weaker ones used such phrases as "goes up in 4's".

(c) Correct responses noticed that the sequence was all even while weaker answers talked about the number 67 not being in the 4 times table. A relatively small number looked at the numbers in the sequence close to 67, which was a more challenging method.

13 **(a)(i)** Throughout this question there was confusion between mean, median and mode, so 21 was often given as the mode as this was the middle bar in the bar graph, indicating a confusion with median.

(ii) The range was frequently given as an interval, such as 18 to 24.

(b)(i) The answer of 9, the median of the given numbers, was often given as the mean. Other candidates followed the 'pattern' of the three numbers given in the table and gave the mean as 17.

(ii) Many candidates commented merely on the figures, rather than their interpretation as a temperature.

14 **(a)** Candidates that scored zero seemed to have an apparent lack of understanding of the requirements to multiply the price per kg by the quantity. The majority of those that managed to find £11·75 then made an attempt to find the total cost and price per kg of carrots. There was an attempt to divide the total cost of the carrots by 8, however it did appear that many candidates did not have a calculator and therefore guessed the price per kg, or used 0·47 and multiplied it by 8.

(b) There were many instances when candidates doubled the recipe and wrote 8 servings as the answer. Many obtained the 3, most often without any working, which implied that candidates had found 900 ÷ 300 but many did not then realise that the recipe served 4, so they did not find 3 × 4.

15 The most common error was finding the perimeter, with some just adding the two numbers on the diagram, 4·7 + 8·3 to give 13. The inclusion of units varied from centre to centre. Many omitted units altogether and often when units were included the error was to write cm not cm^2. Candidates clearly knew that the unit was not cm^3.

16 Many candidates thought this was an equilateral triangle with 'three equal angles of 64°,' or they forgot the third angle and attempted 180 – 64 to give 116°. A few thought that the other base angle was equal to angle *x*, so they obtained 116 and divided by 2 to get 58°. Most candidates seemed to know that the angles of a triangle sum to 180°.

B275 Module Test M5

General Comments

There was a wide range of achievement on this paper but some candidates had clearly been entered at too high a level as they attempted very few (and in some cases no) questions. The majority of candidates were reasonably well prepared for the exam; many however lost marks as they failed to show working.

Many candidates appeared not to be able to distinguish between decimal places and significant figures.

The questions on rotation, listing and probability were tackled well by candidates. The questions on volume, bearings and pie charts showed that these were the weakest topics.

Comments on Individual Questions

Section A

1 **(a)** Generally well answered, the most common error being 30.

(b) Generally well answered, the most common error being −12 or 12.

(c) Generally well answered, the most common error being 20.

(d) Many candidates scored full marks. Of those who did not, some incorrect answers came from simple errors in multiplication, eg 5 × 1 = 6. Common incorrect fractions given were 6/11, 15/8 or 8/15 from cross multiplying. Other candidates correctly multiplied to get 5 and 24 but did not know what to do next - often an answer 29 was then given from adding or 120 from multiplying.

2 **(a)** Often correct. 90° was the most common error. 270° was also seen as well as apparently random angles such as 115°.

(b) Many found difficulty marking the centre. When attempted, the centre was often given at the base, or 1 square down from the base, of shape A.

3 **(a)** Most candidates showed some understanding here. Unfortunately a number of candidates only partially simplified the expression, giving answers such as $9p - 2p$. Some only gave the coefficient 7 and omitted p. Other than this, errors in notation were rare.

(b) Many were able to write at least a partially correct answer. The majority of errors arose from dealing with negative terms incorrectly. Some attempted to combine terms, giving answers in the form *Nabc*, but these were in the minority. $14b$ was the most commonly wrong term.

4 **(a)** Many correct answers.

(b) Poorly done with much confusion over rounding decisions and some failures to keep the number the same size. Quite a few added a 0 after having rounded correctly to 2dp. Other common responses seen were 587.67, 587.7, 587.70, 587.78 and 587.689.

(c) Many errors of 55 000 and 60 000 were seen but also many successful responses. Other common errors were 54 770 and 54 000.

(d)(i) Many did not estimate and just tried to calculate the original sum. When rounding was attempted it was often 28 × 18. Candidates that correctly rounded the numbers often didn't get the correct answer making errors such as 30 × 20 = 60, 30 × 20 = 500.

(ii) A lot of responses stated ‘rounded to the nearest 10’ or just the figures, eg ‘18 rounded to 20’: they had failed to use ‘up’. A few responses stated ‘bigger because of multiplying the numbers’.

5 **(a)(i)** This was often within the acceptable range. 120° was a common error although some acute angles were given. Some candidates gave the answer as 8cm.

(ii) Many candidates scored full marks. Of those who did not give a correct answer, many failed to write down the length of the measured line and thus lost the opportunity to score method marks.

(b) It was rare for both marks to be awarded. Those that got the bearing within range tended to have difficulty with the distance, with many lines around 5.5cm in length. Some measured the correct angle but anticlockwise from N. Often no clear position for D was shown.

6 **(a)** Very well answered with many candidates listing in a systematic way.

(b) Many correct answers. A small number of candidates gave the answer in an incorrect form, and a small number gave the denominator as 11 as they failed to include the given combination.

Section B

7 **(a)** Generally well answered, with 11 being a common error. Embedded answers were common throughout this question.

(b) Also well answered. The most common error was to do 54 – 6 and give the answer 48.

(c) Generally well done. Algebra or any form of working was rarely seen so usually 2 or 0 marks were scored. 68 was quite a common error.

8 Only a small number scored full marks. Of those who gave the answer 213·12 many omitted the units or gave cm or cm^2. Many wrote 213 or 213.1 without any working and thus did not score any method marks. A large number of candidates clearly did not know how to calculate volume: a wide variety of attempts to calculate surface area or total lengths of edges were seen. Calculations of a fairly haphazard nature, such as adding the given lengths, (21 was a very common incorrect answer) or doubling the given lengths and then adding them, were seen quite frequently.

9 Several candidates scored full marks: many just wrote 'A by £30' without showing any working. Of those who did not score full marks several gained 2 marks for giving 80 as 20% of 400. The common misconception was to subtract 20 from 400. A number of candidates had not understood the question and also attempted to take 20% off the price of shop B.

10 **(a)(i)** Many correct answers were seen. The most common error was not to realise a percentage had been asked for and to give the answer as 90(°).

(ii) Usually incorrect as many struggled to give a clear reason. Responses often referred to emissions being the smallest sector with no numerical evidence. Others stated 10% or 1/10 but with no connection to 72. A number incorrectly stated 2° per vehicle.

(iii) Very few candidates could answer part (iii) correctly. Attempts to find the angle in the pie chart by drawing lines were quite common, as were calculations involving 72,720 and/or 90. Those candidates who did attempt to measure the angle often gave very inaccurate answers, although many failed to write down the angle or percentage.

(b) Often correct. The most common errors were 65 (with omission of decimal point or % sign), 99.65 (subtraction from a misconception of 100%) or 0.35.

11 Although most candidates were able to attempt this question with some success, and many scored 2 marks, only a small minority of them showed any evidence of having used compasses. Many seemed to attempt to draw a shape that was similar to the sketch, resulting in an incorrect diagram - although most corrected this in their final answers.

12 **(a)** Well done by many. The most common errors were 1, 2, 3, 4 or 0, 2, 4, 6 from creating a pattern rather than substituting into the given equation.

(b) Some candidates needlessly lost a mark here as although they had plotted the correct points they failed to join them.

13 **(a)** Many candidates found this difficult. Responses that gave the suggestion that a trapezium does not have four sides were quite common. Many candidates simply repeated the information in the question. Many answers clearly referred specifically to an isosceles trapezium.

(b) Many correctly stated square, however rhombus and parallelogram were common answers. Some stated triangle or 3D shapes. A few bizarrely stated trapezium.

B276 Module Test M6

General Comments

A full spread of scores was seen on this paper and there was sufficient time to complete the questions. Most candidates attempted almost all of the questions indicating that they had been well prepared for the module and a significant number performed very well. A minority of candidates struggled with many of the questions and might have had a more positive experience if entered for a lower module.

Most candidates had the required equipment. Working was often seen, although many candidates lost marks because of a low standard of basic arithmetic. Written reasons were often poor, with a failure to make use of mathematical language.

Comments on Individual Questions

Section A

1 **(a)** Most candidates gained at least 1 mark for plotting at least two points on the scatter diagram within the required tolerance, with the majority scoring both marks.

(b) The better responses gave clear statistical reasons involving no correlation or no possible line of best fit. Many said that there was no house plotted at 30 years or missed the fact that all of the houses had four bedrooms and gave a response about not knowing the number of bedrooms. There was some confusion between zero correlation and negative correlation.

2 **(a)** Many candidates correctly reached the answer here. Common errors were to evaluate 2^3 as 6, leading to an answer of 18, or to evaluate 2×3 first leading to an answer of 216 or just 6^3.

(b) Again, many candidates were correct, although even some left an answer of 6^2 and did not score. Similarly to (a), 6^2 was often evaluated as 12. Some attempted unsuccessfully to calculate 14^2 and 8^2.

3 **(a)** Many candidates successfully reached 15/48, but many did not attempt to simplify, made numerical errors in cancelling and did not get a correct final answer or attempted to change their fraction into a mixed number. Very few cancelled before multiplying and many could not evaluate 6×8 correctly. There was some confusion with division, with the second fraction being inverted before multiplying. Some attempted use of a common denominator and then multiplied the numerators but not denominators.

(b) There were a few well thought out solutions, but most were unable to see a way in and omitted the question altogether.
Methods used included:

- 2/3 is roughly 66% and 3/4 is 75%, so 7/10 will be in between
- a diagram leading to a solution of 11/16
- using a common denominator of 12 leading to 8/12 and 9/12, but most could not then progress to 17/24 and often left their answer with 8.5 as the numerator

Some gave answers that were not between the given fractions such as 1/2, 5/6 or 8/9. Answers that would have simplified to 1 were common too. Some candidates just attempted to add, subtract or multiply the fractions.

4 **(a)** This was poorly answered, with many candidates guessing a pattern such as 3, 2, 1 or 2, 4, 6 rather than substituting into the given equation.

(b) Most candidates followed through and plotted their points correctly although many did not join them. The best responses gave neat diagrams with a ruled line extending beyond the axes.

(c) It was rare to see a correct answer, though some got 9 by substitution into the equation rather than reading off the graph. If candidates realised that reading from the graph was required, it was common to see a reading at $x = 1{\cdot}5$ rather than $x = -1{\cdot}5$.

5 This question produced a wide spread of scores. A significant number scored full marks. The best responses reached the £78.75 part by calculation of 3 × 22·50 + 11·25, but many added the six sums of money. Common errors were failure to add either £25 or, more rarely, £47·75 or addition of 25p rather than £25. Some candidates had difficulty in halving £22·50 while others omitted the half hour completely. Some arithmetic was very careless. Candidates need to understand the need to check that their answer is sensible - £70 000 for half a day's work (with computer parts costing under £50) should be identifiably wrong.

6 Very few candidates scored all 4 marks. Many scored 2 marks for 42° and alternate or 'Z' angles. Many then went on to give 122° and corresponding angles. Of those who worked out 80° correctly, few gave complete reasons, usually just stating 'angles in a triangle' but failing to give 'angles on a straight line' to show how they had found 58°. A few candidates scored a follow through mark after a wrong 42. Several assumed the triangle was isosceles, and confusion between corresponding, alternate and supplementary angles was also demonstrated. Candidates should be aware that 'angles on parallel lines' is insufficient.

7 **(a)** Many correct answers seen, although $4a$ and 4^a were common errors.

(b) Few candidates gained full marks but many scored the method mark for either evaluating $(-3)^2$ or 2 × -3 correctly, having shown some method. Of those who correctly found both 9 and –6, many could not add them correctly to get the final answer, with –15 common.

Section B

8 (a), (b), (c) & (d) There were lots of fully correct answers seen to this question, although some candidates seemed to have little understanding of stem and leaf diagrams. Answers to (a), (b) and (c) were usually correct, however some candidates gave the answer 5 in (a) from just counting the number of stems in the table.
More difficulty was found with finding the median, with answers of 41, 41·5, 43 and 45 common. Candidates who showed crossing off in the table generally gave correct answers. Some responses calculated the mean rather than the median.

9 (a) There were a lot of good answers for this question, with most candidates appearing to have access to both a ruler and a protractor. Most lines were accurately drawn at 6·5 cm, with more problems being seen with the angle, which was often drawn at around 140°. Only the very weak responses gave an acute angle.

(b) Many candidates followed through from their triangle to score both marks here, demonstrating understanding of perimeter, although some attempted to calculate the area using the given 10 and 6·5. Some candidates measured their BC inaccurately, but scored the method mark for calculating the perimeter, although marks were lost when the length used was not recorded. Some candidates appear to give a length to the nearest centimetre automatically, so lost marks for their measurement being outside the 2 mm tolerance. Some candidates attempted to use Pythagoras' theorem, despite the absence of a right angle, to calculate the side BC rather than measuring from their triangle.

10 Many candidates did not write down the answer from their calculator display before rounding it, so scored no marks when all that was seen was an incorrectly rounded value such as 13·67 or 13·60. The most common answer was 13·56, the truncated value, which did score 1 mark. Some rounded to one decimal place rather than two. Others did not use the correct order of operations, but correctly rounded to two decimal places so scored the special case mark.

11 (a) The better responses showed well-presented, accurate algebra but most candidates found the equation too difficult. Some multiplied out the brackets, reached $4p + 12 = 22$ but did not try to go any further; perhaps feeling that they had done all that was required. Others who had not dealt with the brackets correctly scored a method mark for showing a correct method to solve the equation they had found. There were lots of unsuccessful trial and error and reverse flow chart methods seen, which failed to score.

(b) Some found this straightforward. Most candidates knew that the first term should be r^2, but the second term proved more of a problem, with 2 or 2^r both seen frequently.

(c) Again, some had no problem with the straightforward factorisation, although $5(q + 10)$ and $15q$ were common errors. Some candidates omitted both parts (b) and (c).

12 (a) Most candidates scored at least 1 mark for writing the ratio 24 : 16, which was not always fully simplified, with 6 : 4 being a common final answer. Some cancelled incorrectly and others went too far in simplification giving answers such as 0·6 : 0·4. Some candidates who failed to score had added to get 40, and then used that in their ratio.

(b) A good number of correct answers were seen. Very few candidates scored part marks, as those who did not have the correct answer seldom showed working. A common wrong answer was 0·71, coming from 0·1+ 0·3 + 0·25 = 0·29, but this did not score unless working had been seen. Some candidates just appeared to guess an answer based on the given numbers.

13 Many of the better responses calculated the area correctly, but often failed to give units, despite the explicit demand in the question. Some candidates omitted the question completely. Many formulae involving π were seen, with the use of πd, $r\pi^2$ or $(\pi r)^2$ common. Some knew the correct formula, but doubled, rather than squared, the radius of 12.

14 (a) Many candidates did not understand translation, with enlargements, reflections and rotations also being seen. Of those who did translate, the vector notation was commonly misunderstood with the correct number of squares moved, but in the wrong direction.

(b) Despite being given most of the description of the transformation, many could not see what was missing. Some candidates identified that the direction was missing, but then spoilt their answers by saying it should be left or right. There was some use of combinations of transformations, with translations, usually left, being included. Many did not understand the term 'origin' and said that the centre of rotation had been omitted.

B277 Module Test M7

General Comments

There were a few questions on this paper, notably Q.13, that candidates appeared to find hard; this depressed the marks and meant that candidates gaining more than 20 marks on each section were rare. In general, the marks on section B were lower than those in section A. As usual, there were some candidates who chose not to attempt several questions.

Papers were well presented and most candidates appeared to have access to geometric instruments. However, not all candidates appeared to have access to a calculator, which was especially apparent in Q.8 and Q.12. Candidates did not appear to be short of time on the paper.

Comments on Individual Questions

Section A

1 **(a)** This was generally answered well with many fully correct responses. A few only got as far as dividing 18 by 3; one or two gave the final answer as a ratio 12 : 6 without selecting the appropriate value. Arithmetic slips were rare.

(b) This was not done quite as well as part (a), but there were a lot of correct responses nevertheless. The most common error was to think that there were 24 members in all, rather than 24 women members. As a consequence some candidates divided 24 by 6 and then multiplied by 2. A few candidates correctly divided 24 by 3 but failed to multiply by 2, so 8 was a common wrong answer.

2 **(a)** This question was answered confidently by some, but was not well done by many candidates. Those who attempted to multiply out the powers of six generally failed and probably wasted a lot of their time. Some candidates left their answer as $6^9 \div 6^7$ and a few gave their answer as 36.

(b) Most candidates made a reasonable attempt to find some factors of 420, enabling them to score at least 1 mark. Most used a factor tree, but were often let down by their arithmetic or failed to reduce all the factors to prime. A few found the prime factors but failed to express the answer as a product. Some candidates managed to divide by 2 but did not know how to proceed when they reached a factor of 105.

3 **(a)** The majority of candidates recognised this to be negative correlation but often did not comment on its strength and so did not earn the mark. Many thought the correlation was weak rather than moderate or strong.

(b) Most candidates drew a satisfactory line of best fit. Rulers were nearly always used.

(c) Reading off from the line of best fit was done well. The accuracy was good with only a very few candidates misreading the scale.

4 **(a)** Some candidates scored well on this question, but others floundered. Many managed to pick up some marks, often for expanding the brackets or for following through for their final answer after wrong working such as $2x + 7 = 6x$. A number failed to reach 3·5 or equivalent after reaching $4x = 14$, but most who did get as far as $ax = b$ knew that $x = \frac{b}{a}$. Several left $2x + 14 = 6x$ as their final answer.

(b) This question was not done well. Some candidates managed to solve the inequality correctly but few were able to represent the solution on the number line. Some candidates solved this as an equation, either formally or by inspection, and so identified the '-3 '.

5 **(a)** This question was done surprisingly poorly. There was evidence to indicate that many candidates were unable to use the recurring notation. Those who did divide 3 into 2 often produced answers that were not acceptable (eg 0.6, 0.66, 0.67). Other wrong answers included 1.5, 0.23, 0.33.... , 66.6, 2.3.

(b) Converting 0·128 to a fraction was done very poorly; hardly any candidates obtained a fully correct answer and some candidates made no attempt. A few did make an appropriate start from 128/1000, but not all were able to reduce it to its lowest terms. Common incorrect starting points were 128/100 and 128/200. Other answers included 0·128/100, 1/8, 1/128, 0·128 × 100.

6 **(a)** Some candidates attempted to draw diagrams, usually giving up fairly quickly. Others tried to develop the sequence 1, 3, 6, …, but relatively few succeeded in determining the correct term from this method due to errors in their arithmetic. Those who used the formula were more successful. However some failed to cope with the brackets and calculated (20 × 20 + 1)/2 = 401/2 etc, while others obtained 420 but were unable to divide by 2. A few made a partial substitution; they recognised that n should be 20, but they weren't sure about $n + 1$ so gave $20(n + 1)/2$.

(b) In finding the nth term, most candidates recognised that a 2 and possibly a 1 were involved somewhere. The most common wrong answer was $n + 2$, while other responses included $2n + 1$, $2n$ and × 2 + 1.

7 Those who attempted the construction with compasses were usually successful, although sometimes the path did not reach the hedges. Some drew in the arcs but failed to draw the path. A few realised that they needed compasses, so sketched 'arcs' to make it look as though they had used them; however these attempts were usually inaccurate and rather obvious. Many drew in the path without a construction and were often accurate enough to earn 1 mark, but again many of the paths drawn fell short of the edge of the field. Some drew parallel lines. There were a number of no responses here, which could be due to lack of equipment, lack of time or lack of knowledge.

Section B

8 Candidates who were comfortable using their calculators for percentages coped with this question, but inappropriate methods were common, such as calculating 3% and 0.7% separately and often inaccurately. Responses suggested that not all candidates had calculators. Some multiplied by 3·7, obtained 871·35 and gave this as their answer, scoring 1 mark. The common mistake was to start by dividing 235·50 by 3·7 before adding the result to 235·50; this scored no marks. Some candidates calculated a 37% increase.

9 **(a)** Those who knew about relative frequencies answered this with confidence, but many candidates were searching for patterns in the table. Some calculated '1 – total relative frequency' and then split the result between the two remaining frequencies, sometimes equally 0·32 and 0·32, and sometimes in other combinations eg 0·36 and 0·28. Another frequent error was 0.18 and 0.26 - it was easier to see where this had come from.

(b) It was rare to be able to award both marks here, with many responses demonstrating a lack of understanding of relative frequency. Candidates said that the relative frequencies did not add up to 1, the results were too varied or the frequencies should increase as the number of throws goes up. Candidates who did notice the lack of sixes often did not include numerical values. Some made no attempt to answer this part-question.

10 **(a)** Many candidates knew that speed = distance / time and scored 1 mark for 15/25 = 0.6 but then went on to multiply by 100, using 100 minutes in an hour. Few candidates scored 3 marks. Of those responses scoring no marks, both 25 × 15 and 25/15 were common, whilst a few candidates used the junction number in their calculations.

(b) Calculating an estimate of the mean was done well. The main errors were 780/4 or the total frequency, 30, divided by 4. Some found the total of the midpoints and divided by 4.

(c) Wrong answers were varied, but the main mistake was recording the upper limit as 9.4. Other errors included 8 to 10, 8 to 9 and results which included the junction numbers.

11 Rearranging the formula was done quite well. The main error came from the wrong first step of $W – 7 = 5n$ or attempting to divide the equation by 5. Poorer responses often involved simply swapping the positions of n and W.

12 It was quite rare to see a completely correct answer here, but many candidates scored 2 marks for successfully finding at least one area. Some candidates calculated areas correctly, but then added them instead of appropriate addition and subtraction. The most frequent mistake in the better responses was forgetting to halve the areas of the circles. Poorer responses involved adding the radii or multiplying the radii together. Some candidates attempted to use Pythagoras' theorem, since it did not appear elsewhere.

13 This was a challenging question for most candidates. There were very few fully correct proofs, with many candidates not attempting an answer. Those who managed to attain marks here scored mainly for the 60 degree angle in the triangle or the exterior angle being 30 (usually from 360/12). Others knew that the angle sum should be 1800, but were unable to link all the parts together. Many candidates just tried to sketch diagrams. Some reasoned that 3 × 4 = 12 and tried to make that fit the situation. Some better responses did score 3 marks, but the final link was found difficult by everyone. It seemed that the generic term 'polygon' was not understood by some candidates, with statements such as "polygons always have 4 sides" (or 3, 5, or 6) appearing occasionally.

B278 Module Test M8

General Comments

Examiners felt that the paper was appropriate for those candidates targeting a grade B. The standard of performance varied considerably and produced a wide range of achievement. Many candidates had been entered at the appropriate level and were able to demonstrate their knowledge, rather than what they did not know. Those inappropriately entered scored marks in single figures. On the whole candidates performed slightly better on section B, largely due to the two questions involving explanations in section A. Working was seen in many scripts but this was frequently difficult to follow. The questions on trigonometry, similar triangles, box plots and inequalities proved to be the weakest topics. Candidates should be encouraged to cross out and replace incorrect answers rather than overwriting digits which then become difficult to decipher.

All candidates had time to complete the two sections of the paper.

Comments on Individual Questions

Section A

1 Many candidates struggled to make any headway with the inequality. Some candidates did not spot the requirement for x to be an integer and therefore tried to give inequalities as the answer rather than a list. One of the most common errors was to try to add/subtract the -20 and the 12, leading to answers such as $5x < 32$ and then $x < 6{\cdot}4$. Some who knew what was required did not consider 0 to be an integer. Others listed values of either $5x$ or x between -20 and 12.

2 This question was fairly well answered on the whole, with a good number of correct answers being seen from correct working. Those who attempted to convert to improper fractions first and then find the common denominator were usually more successful in finding the correct mixed number. Candidates subtracting integers first often struggled to cope with the negative result of $\frac{1}{3} - \frac{3}{4}$. Some candidates did not work with a common denominator. Errors in simple arithmetic caused many to lose marks.

3 **(a)** Many candidates were successful in solving the equation. Typical errors involved multiplication by 7 with $6x – 1 = 14$ being very common and $6x – 7 = 2$ also seen. Having obtained $6x = 21$ many candidates failed to cope with division by 6 and 3·3 was a common wrong answer. Unfortunately, a small number of candidates lost some marks by failing to evaluate their steps at each stage and obtaining final answers such as $\frac{2 + 1 \times 7}{6}$. A significant number of candidates attempted trial and improvement, often without any success.

(b) Although some good attempts were seen, a greater number of candidates struggled to cope with the algebra involved. A pleasing number of candidates expanded the brackets correctly, although among incorrect responses $4x – 2y$ was the usual error. Collecting the x terms was beyond many, with some candidates offering $x = 4x – 8y – 3$ as their final answer. Those who did attempt to collect the x terms often made sign errors and obtained $5x$. A surprising number of candidates stopped with $3x$ as the subject. Other common errors included $3 + 8y = 11y$ and incorrect division by 3.

4 **(a)** Approximately half of all candidates obtained the correct answer. Common incorrect answers included $6{\cdot}2 \times 10^4$, 62×10^{-5}, $6{\cdot}2 \div 10^4$, 62×10^3.

(b) Surprisingly, candidates performed no better on this part of the question. The most common approach was to change both numbers to ordinary numbers before adding and then converting back to standard form. These candidates often reached the number 1840 but then could not, or forgot to, change their answer to standard form. Other candidates simply added the 2·4 and 1·6 and the powers of 10 with $4{\cdot}0 \times 10^5$ being a very common wrong answer.

5 **(a)** Many candidates showed no understanding of the reasons for similarity. Even when they did, they often gave an incomplete explanation. Most of these candidates simply said, "angles are equal", with no attempt to clarify what they meant. Some may have meant all the angles, but since they showed no calculations they lost the mark. Others made it clear they were only talking about the 120°. Relatively few stated that they meant all the angles. Many added the fact that sides were proportional, that one triangle was an enlargement of the other or that angles in a triangle add to 180°.

(b) Candidates achieved greater success in this part of the question. Even when the scale factor of 1·5 was recognised many could not cope with 21 ÷ 1·5. Those candidates working with fractions were usually more successful although some rounded their fraction to 0·66 and lost the final accuracy mark. By far the most common incorrect answer was 21 – 5 = 16.

6 **(a)** Candidates scored well on this question. Some candidates did misread the scale, but still picked up a mark for showing working. A fair number seemed to have misread the scale, but showed no working and therefore lost both marks.

(b) Many candidates struggled to cope with the explanations. For the first reason, candidates were expected to refer to the median (or average with the values given). Many also went on to quote other reasons related to ranges or quartiles and lost the mark as a result. For the second reason, candidates were expected to refer to the upper quartiles and their relevance to the age 60. Many found this more difficult and comments such as "A has a bigger upper quartile" or a comment about only one town lost the mark. Many showed a lack of understanding of box plots by saying things like there was no-one over 60 in town B or the maximum age was 54. Others seemed to say "disagree" because they had said "agree" on the first one and then wrote almost anything down.

7 There was a good spread of marks awarded for this question with slightly more scoring 0 than any other mark. However, the majority picked up at least 1 mark for identifying two correct equations. The straight line and the reciprocal graphs were often correct while $y = x^2 - x$ was frequently seen for the quadratic.

Section B

8 **(a)** Many candidates achieved success with the rotation and scored both marks. A few rotated 90°, usually clockwise, and some rotated about the wrong centre, usually the origin.

(b) Many correct answers were seen. A common error was to translate 4 down and to a lesser extent 4 in the *x*-direction. A few miscounted the squares.

(c) Almost half of the candidates were able to describe the single transformation. A partially correct transformation, with either the wrong centre or the wrong angle, earned some candidates a mark, but a large proportion could not answer or gave multiple transformations.

9 About 25% of candidates could work out the correct reduction. Many of the others found the price reduction but few would then calculate 91 ÷ 490. Some did manage to calculate the new price as a percentage of the original but then forgot to subtract this from 100. Some who did calculate 81·5% went on to subtract from 100 and obtained 19·5%. Many of the others tried trial and improvement, quite often working with whole percentages only, and rarely picked up all 3 marks. Some used non-calculator methods by working out various percentages of £490 and then trying to mix and match them to give £399. This involved much repetitive working out which often contained errors and very few reached the correct answer.

10 Over half of all candidates earned full marks. Of the rest, most earned some method marks by equating coefficients and attempting to eliminate one variable, but errors in dealing with negative numbers frequently led to incorrect answers. A small number of candidates used the method of substitution. Examiners commented on the number of multiple attempts to solve the equations. Candidates need to be aware that they should cross out incorrect attempts to avoid the possibility of losing marks.

11 (a) This was answered well by the vast majority of candidates. A common error was to give the probability of a second white as $\frac{3}{4}$.

(b) Well over half of the candidates earned both marks. Some candidates struggled to multiply their two probabilities, often changing the fractions to common denominators before multiplying and often adding instead. Some just added and obtained answers greater than 1, but failed to realise that this was impossible. Over 25% of candidates earned no marks.

12 Many good attempts were seen with over half the candidates earning all 3 marks. Some used a multiplier of 1·6 instead of 1·06. Others increased by 6% year on year rather than multiplying by $1{\cdot}06^3$; this occasionally led to the wrong number of years. Others used simple interest and a significant number reduced the principal year on year. A small number lost the final mark by truncating their answer and 2977 and 2977·5 were often seen.

13 This tended to be 2 marks or 0 in almost all cases with slightly more obtaining the correct answer. Common errors included calculating four-point moving averages or finding the average of the previous moving averages.

14 This was poorly answered by the vast majority, with approximately 70% of candidates earning no marks. Many candidates seemed not to have covered trigonometry, did not recognise the need for it or did not know how to apply it. Many simply assumed angle APB was a right angle and used angles in triangles to obtain an answer of 25°. Some candidates thought that because the base distance was twice as big in the triangle on the right then the angle would be half the size. Many of the candidates who used trigonometry used the tangent, but a lot were unable to set up and manipulate their expressions correctly. Some gained 3 marks for finding PQ, but then struggled to find angle PBQ. Others thought the angle QPB was the angle of elevation.

B279 Module Test M9

General Comments

There was, as usual, a wide range of achievement on this paper. A number of candidates were well prepared for the exam, making efforts to show working and appearing to be equipped with a calculator for Section B. There were also, as usual, many candidates who struggled with the mathematical content and skills required at this level. Candidates should be advised to make it clear in their solutions which method they want the examiner to follow to ensure marks are awarded.

The questions on powers of zero, drawing histograms, expanding a pair of linear brackets, factorising using the difference of two squares, rearranging formulae, and probability were the most well answered. Describing transformations, trigonometry, length of a line between two coordinates, equations of perpendicular lines, problem solving with areas of sectors, calculations with bounds, and proportion were the weaker topics.

Comments on Individual Questions

Section A

1 **(a)** Almost all of the candidates were successful with this problem involving a power of zero.

(b) This part proved an effective discriminator. Many candidates understood that a root was required at some stage but not all understood that it was a cube root. Some recognised that the problem involved finding the cube root of 27 and then squaring the answer, but then either did not or could not evaluate this to a correct value. A few gave an answer of 18 from evaluating $\frac{2}{3}$ of 27.

The correct answer of 9 was achieved by fewer than half of the candidates.

2 Most candidates recognised the need to round the values in the problem to one significant figure in order to obtain an estimate for the calculation. Many were able to arrive at an answer with the figures 75 or 9, but very few were able to provide a correct estimation in standard form. A surprising number tried to convert both values to full decimal numbers instead of working with the estimates in standard form and combining the indices which would have been more efficient.
Some rounded only one of the figures or attempted a calculation with the accurate values.
The most common errors resulted from variations of attempts at $3 \times 10^4 \times 25$, including $3 \times 10^4 \times 25 \times 10^6$, and then making mistakes with the powers of 10.
Also candidates cancelled zeros from 30000 × 25000000 leading to answers such as 7500.

3 The better responses to this provided the correct transformation of enlargement and candidates recognised the need to include a scale factor and centre of enlargement as part of the description. A few gave positive scale factor of 2 rather than negative 2.
However, the overwhelming majority of candidates did not give a single transformation and often after using the term enlargement, a rotation of 180° or a translation was also mentioned and in these cases the maximum mark allowed was 1 mark for those that gave the correct coordinates of the centre (of enlargement).

4 **(a)** This question was done well on the whole with many of the candidates scoring full marks. A number scored 2 marks as a result of plotting one bar at the wrong height, often from an arithmetic error in the frequency densities.
Fewer candidates scored 1 mark, usually for two correct bars, although some did plot the bars at the wrong heights even though they had given two correct frequency densities by the table.
Nearly everyone attempted this question and very few drew bars with the wrong widths.
Some did not use rulers, but managed to stay within the tolerance allowed.

(b) This was moderately well answered with many candidates stating that the exact lengths of the calls were not given. Some thought the statement was correct. Common errors in the reasons included "there may have been a call longer than 80 minutes", "the longest call was 30 minutes" by using the length of the final interval, "the highest frequency was 10 to 30 minutes not 80 minutes" or "it was only a three month period so there may have been longer calls in a different period".

5 **(a)** This was generally well answered. Those that did not score all 3 marks often gained 2 out of 3 marks for getting two correct terms in their final answer or for showing three correct terms in working.
The most common error was with the combined '$-7x$' term where $+/-13x$ was often given. Some candidates made mistakes with either the coefficient or the power of the x^2 term. On a few occasions, '– 8' or '– 2' was seen instead of '–15'. Only a few candidates made careless errors rather than method errors dealing with the multiplication.

(b) This question discriminated achievement well. Some candidates found the correct factors, though not all of them went on to give the solutions, thinking they had finished, while others made errors such as giving $\frac{5}{7}$ or 7 from the $(5x - 7)$ factor.
Of the many who did not factorise the expression correctly, the number terms in the factors were mainly variations of (+/–) 3 and 4.
Other candidates showed little or no idea of what to do and adopted a 'linear equation' approach before abandoning the question.

6 **(a)** Many candidates had little idea that using Pythagoras' theorem was the appropriate method to use and many adopted a gradient type method and calculation.
On the occasions that Pythagoras' theorem was used, it was used well – often up to the final square root stage where $\sqrt{169}$ was sometimes left as the answer or incorrectly evaluated.
A few made errors with the horizontal and vertical lengths between the two coordinates but considered Pythagoras' theorem for which they received some credit.

(b) This part was not done well in general, but there were some excellent answers and work on this topic has shown some slight improvement.
Many scored a mark for having +5 in their final answer of the form $y = mx + c$, but with various incorrect gradients of which $\frac{1}{4}$, 4 and –4 were the most common.
Some recognised the connection of the perpendicular line with the original line and gave the gradient as $-\frac{1}{4}$ but then made errors in the final equation. Some omitted the x part of the equation and gave an answer of $y = -\frac{1}{4} + 5$.
A number of candidates omitted this part.

Section B

7 **(a)(i)** The majority of candidates were successful. There were occasional errors such as $(x - 5)(x - 5)$ or $(x - 5)^2$ and some candidates went on to 'solve' after giving the correct factors.

(ii) Many candidates were well prepared for this part and gave fully correct answers. A small percentage went on to spoil a correct answer by trying to cancel additional terms, with the *x* terms cancelled to give for example $\frac{-5}{3}$ or $\frac{-5}{x+1}$.

A common error was to factorise the denominator as $(2x + 11)(x + 5)$ or to have the incorrect pairing of factors $(2x + 5)(x + 1)$.

A few did not attempt to factorise at all but simply cancelled terms without factorising.

(b) There were many correct answers to the rearrangement and also a number which only gained a follow through mark after an incorrect first step.

Common errors were to subtract 4π or take the square root first.

Some candidates need to ensure that the length of the square root sign covers the whole expression.

8 **(a)** This was very poorly answered overall, with the vast majority of candidates not scoring any marks. A common misunderstanding was to incorrectly use the ratio $\frac{12}{20}$ with sine, cosine or tangent. The small number who did split the diagram into two right-angled triangles, nearly always correctly used $\sin^{-1}\left(\frac{6}{20}\right)$ before multiplying the angle by 2 and completing the problem correctly.

A small number of candidates used the cosine rule as the alternative method for gaining the full marks. Several candidates used Pythagoras first and then were successful in using an alternate trigonometric method.

Some used a justification approach using the angle 35° within their method to earn some method marks.

A significant number omitted this part.

(b) Generally, candidates made a better attempt with this part. Most gained at least a method mark for using the fraction $\frac{35}{360}$ within their working, and there were a number of fully correct answers. Common errors were to find the area of only one of the sectors or to find the areas of the complete circles and not consider the sectors or to use the circumference formula instead of the area formula.

The most common misconception however was to subtract the two radii initially and then attempt $\frac{35}{360} \times \pi 92^2$.

9 **(a)** On the whole, a good response was provided by the majority of candidates, with many fully correct answers seen. There would have been more however, if a number of candidates had multiplied the fractions correctly. This was a surprising weakness at this level and on the calculator section of the paper. The most common errors were $\frac{1}{8} \times \frac{1}{8} = \frac{2}{64}$ or $\frac{1}{16}$ or $\frac{2}{16}$. Several used the wrong probability of 0.8 or attempted $\frac{1}{8} \times \frac{1}{7}$. A small number converted to decimals and used 0.125 and then usually obtained the correct decimal equivalent for the answer, but there were some that approximated and gave an inaccurate answer.

(b) This was also quite well answered with, again, a number of fully correct answers given, though fewer than part (a). In a number of cases again, poor multiplication cost the candidate full marks. Some attempted $\frac{1}{8} \times \frac{7}{8}$ and the reverse pairing but made errors in evaluating the products before adding.
Others reached $\frac{7}{64} + \frac{7}{64}$ but then added incorrectly to give $\frac{14}{128}$ as the final answer.
The majority of candidates were able to earn one method mark at least for showing $\frac{1}{8} \times \frac{7}{8}$ in working.

10 Candidates found question challenging on the whole. Better responses displayed a fully correct method leading to the answer 58, but there were many other answers of 58 obtained from an incorrect method. The most common error seen was 6230 ÷ 108 = 57·685 leading to 58 for which no marks were given.
Other common errors seen were 6235 ÷ 108·5 or 6230 ÷ 107·5. Some realised that an upper bound divided by a lower bound was required but made errors more commonly with the upper bound and used 6230·5 ÷ 107·5.
A large number of candidates did earn at least one method mark for showing one of the bounds that was appropriate to calculation.
A few candidates employed a trial and improvement approach without success.

11 This question proved a good discriminator. Many candidates were well- prepared and adopted standard methods of finding the constant of proportion and then using the appropriate formula to solve the problem. However, a greater number had little idea and many scored no marks.
By far the most common error was to see the answer of 108, from using $d = ks$, instead of $d = ks^2$.
A less common error was to assume inverse proportion and use $d = \frac{k}{s^2}$.
A few candidates used the square relationship method eg $81 \times \left(\frac{4}{3}\right)^2$ to arrive at the correct answer.

B280 Module Test M10

General Comments

Almost all candidates appeared to be appropriately entered and well prepared for this module. There was a wide range of attainment but few gained very low marks. The majority of candidates made an effort to show working but often it was rather disorganised. Some candidates appeared to lack a pair of compasses in section A and as a result did not draw an accurate circle. All candidates appeared to have an appropriate calculator in section B but some failed to use it in an efficient manner.

The questions on converting a recurring decimal to a fraction, expanding brackets and the probability problem were answered well. The congruency proof, using surds, rearranging then solving a quadratic equation and finding the radius of a cone were the least well answered topics, partly as a result of the multi-step nature of the questions.

Comments on Individual Questions

Section A

1 **(a)** The majority of candidates recognised that the equation represented a circle with radius 3. Some candidates failed to use a pair of compasses and frequently the freehand drawings were outside tolerance. A few drew circles with radius 4.5.

(b) A significant number of candidates did not realise that they needed to draw a straight line and they tried to solve the equations algebraically. They were unable to reach solutions and scored 0 marks. Candidates who drew lines were generally successful although some other lines, particularly $y = 4 + 2x$, were seen. The coordinates of the intersections were usually read accurately but errors did occur with omission of the negative sign and misreading the scale.

2 This question was not well answered and the majority of candidates failed to score any marks. Very few achieved full marks. Most candidates appeared to know what they were required to do but then produced lengthy explanations of limited value. Many referred to the radii being the same without extending this reasoning to the diameters being equal and hence AC = NL = 12cm. It was more common to see BC = MN but frequently this was only supported by the 5cm on the diagram. Few candidates provided an adequate justification for the right angles. Even when candidates realised that they needed to justify the 90°, it was more common to see phrases such as 'triangles in a circle are right angled' than a reference to 'angle in a semi-circle = 90°'. Many of the better responses then mentioned RHS, whereas others tended to state SAS.
A significant number of candidates reasoned that there were 2 pairs of equal sides and so the 3rd side also had to be equal and so SSS.
A small number of candidates assumed the right angle then used Pythagoras's theorem to prove SSS.

3 **(a)** A large majority of candidates found $5^2 + 5^2 = 50$ but many failed to show the necessary step between $\sqrt{50}$ and the given $5\sqrt{2}$.

(b) Few candidates scored full marks in this part and the majority failed to score any marks. Some failed to use Pythagoras at all and merely recorded $7\sqrt{2} - 5\sqrt{2} = 2\sqrt{2}$.
Notation was poor, particularly the omission of brackets, and although candidates were generally able to interpret their own notation some misconceptions such as $(7\sqrt{2})^2 = (7 + \sqrt{2})^2$ were evident. Some candidates reached 48 and were then able to proceed to $4\sqrt{3}$. Others found $49\sqrt{4} - 25\sqrt{4} = 24\sqrt{4}$, but then they were generally unable to proceed successfully.

4 Most candidates scored 2 or 3 marks for this question, with 1 mark being lost on occasion for failure to simplify. Some candidates failed to score because they multiplied by 100 instead of 1000.

5 Almost all candidates recognised the basic form of a curve for a trigonometric equation. Performance was spread equally between 0, 1, 2 and 3 marks. Candidates generally started at (0, 2) and used an amplitude of 2, but a common error was to draw a cosine curve starting at (0, 3) and with amplitude of 3. Only the best responses showed consideration for the period of the graph.

6 **(a)** Most candidates answered this correctly. Almost all other candidates used a correct method to expand the brackets but made errors such as recording $5x$ instead of $20x$ or 12 instead of 35.

(b) There were some good responses to this question, scoring 3 or 4 marks. Others though, often showed $(x – 5)(x + 5) = (4x + 7)(x + 5)$. Many candidates did not follow the prompt ‘hence’ and so restarted when expanding $(4x +7)(x + 5)$. The collection of like terms was often inaccurate with $28x$ and/or +30 seen frequently instead of $26x$ and +40. Many failed to rearrange their terms equal to zero. Those that did equate to zero were generally able to factorise and then the majority of these candidates found the correct solutions.

Section B

7 A large majority of candidates successfully multiplied by 1.02^{10}, but a significant minority then failed to round to 2 significant figures, sometimes rounding to 2 decimal places. A few undertook 10 successive multiplications but errors often arose from miscounting steps or recording errors. A small minority of candidates multiplied by 1.2^{10} and a few found 20%, multiplying 2% by 10.

8 **(a)** This question was answered well with a large number of candidates reaching $(x – 3)^2 + 5$, but then many gave a = -3 rather than a = 3. Common errors included $(x – 6)^2$ or $(x – \sqrt{6})^2$ and then ±14, ±23 and ±9.

(b) About half the candidates linked the two parts of the question and gave ‘their b’ as the minimum value. A few candidates gave coordinates rather than the minimum value.

9 Most candidates realised that they needed to use the sine rule and the majority reached the correct length for PR. However a significant number tried to proceed without finding the angle at Q and so scored 0. A few avoided angle Q initially by finding PQ and then attempted to use the cosine rule. A small minority then used angle Q = 106° and reached the correct PQ.

10 Most candidates used the quadratic formula and generally gained a mark for substitution. However errors arose from substituting for b = -8 in '-b', during the evaluation of b^2 or through only dividing the surd part of the formula by 6. Attempts at completing the square were uncommon and, when they did arise, they were generally unsuccessful as candidates could not cope with the coefficient of x^2 not being 1. Some candidates did not recognise the implication of the request to give answers correct to 2 decimal places, and attempted to factorise the quadratic, or to 'solve' the equation using manipulations that bore no relation to any permissible algebraic steps.

11 **(a)** The tree diagram was completed correctly by a very large majority of candidates. A few failed to use conditional probability and a few started with 10 cards. A small, but significant, number of candidates only recorded the numerator on the tree diagram and so lost 2 marks.

(b) The majority of candidates calculated the probability of the three possible outcomes and then added them together, usually successfully. A common error was to calculate the probability of exactly one picture card. It was unusual for candidates to calculate '1 – probability of no picture cards', but when seen it was generally correct.

12 **(a)** A large majority of candidates gained the mark in this question. Those who failed to score often lost the mark by only writing a general statement such as "find the average of 2003, 2004 and 2005".

(b) About half the candidates stated (73 + 79 + n)/3 = 71 and then proceeded correctly to 61%. Some reached the correct equation but were unable to find n. Common errors were to equate the statement to 79 (the percentage for 2007), or to evaluate (70 + 73 + 79)/3 using the moving averages for 2004, 2005 and 2006.

13 About a quarter of the candidates scored full marks for this question. The majority of these candidates found the area of the sector and then equated this to the curved surface area of the cone. Some found the arc length and then equated this to the circumference of the cone but some then found the diameter rather than the radius. A large number of candidates found the sector area or the arc length but were then unable to proceed or tried to involve the formula for the volume of the cone. Some candidates used the 110° sector rather than 250°, but they were still able to gain the method marks.

Grade Thresholds

General Certificate of Secondary Education
Mathematics C (J517)
March 2010 Examination Series

Unit Threshold Marks (Module Tests)

Unit		Maximum Mark	a*	a	b	c	d	e	f	g	p	u
B272	Raw	50							37	24	15	0
	UMS	70							60	40	30	0
B273	Raw	50							27	13		0
	UMS	79							60	40		0
B274	Raw	50						37	24	14		0
	UMS	90						80	60	50		0
B275	Raw	50						30	14			0
	UMS	99						80	60			0
B276	Raw	50					31	16				0
	UMS	119					100	80				0
B277	Raw	50				24	12					0
	UMS	139				120	100					0
B278	Raw	50			29	15						0
	UMS	159			140	120						0
B279	Raw	50		29	14							0
	UMS	179		160	140							0
B280	Raw	50	31	15								0
	UMS	200	180	160								0

Notes

The tables above show the raw mark thresholds and the corresponding UMS for each unit entered in this series. Raw marks in between grade thresholds are converted to UMS by a linear map.

For a description of how UMS are calculated see:
http://www.ocr.org.uk/learners/ums/index.html

For a spreadsheet designed to calculate UMS for this specification, please visit the e-community at http://community.ocr.org.uk/community/maths-gcse-ga/home .

The grade shown in the first table as 'p' indicates that a candidate has achieved at least the minimum mark necessary to access the UMS scale for the unit but insufficient raw marks to merit a grade 'g'. This avoids awarding such candidates a 'u'. Grade 'p' can be awarded only for units B271 (Module Test M1) and B272 (Module Test M2). It is not a valid grade within GCSE Mathematics and will not be awarded to candidates when they aggregate for the full GCSE (J517)

Statistics are correct at the time of publication.

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